ANNUAL REPORT 1965

SIDNEY TOWNSHIP (Batawa)

water pollution control plant

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Ontario Water Resources Commission

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ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

Members of the Sidney Township (Batawa)
Local Advisory Committee,
Township of Sidney.

Gentlemen:

I am pleased to provide you with the 1965 Annual Report for the Sidney Township (Batawa) Water Pollution Control Plant, OWRC Project No. 62-S-121.

We appreciate the co-operation you have extended to our Operations staff throughout the year, and trust that continuation of this close association will ensure even greater progress in the sphere of water pollution control.

Yours very truly,

D. S. Caverly,
General Manager.

ONTARIO WATER RESOURCES COMMISSION

801 BAY STREET

TORONTO 5

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J. H. H. ROOT, M.P.P.
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D. S. CAVERLY
GENERAL MANAGER

W. S. MacDONNELL
COMMISSION SECRETARY

General Manager,
Ontario Water Resources Commission.

Dear Sir:

I am pleased to provide you with the 1965 Annual Report on the operation of the Sidney Township (Batawa) Water Pollution Control Plant, OWRC Project No. 62-S-121.

The report presents design data, outlines operating problems encountered during the year and summarizes in graphs, charts and tables all significant flow and cost data.

Yours very truly,

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

FOREWORD

This report provides useful information on the operating efficiency of this project during 1965. It is intended to act as a guide in gauging plant performance. To implement that aim, it includes detailed statistical and cost data, a description of the project and a summary of its operation during the year.

Of particular interest will be the cost data, which show the total cost to the municipality and the areas of major expenditure.

The Regional Operations Engineer is primarily responsible for the preparation of the report, and has compiled and arranged the material. He will be pleased to answer any questions regarding it. Other groups, however, were involved in the production, and these include the statistics section, the Drafting Section of the Division of Sanitary Engineering and the Division of Finance.

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

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SIDNEY TWP. (BATAWA)
water pollution control plant

operated for

THE TOWNSHIP OF SIDNEY (BATAWA)

by the

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Assistant Director: C. W. Perry
Regional Supervisor: D. A. McTavish
Operations Engineer: J. N. Dick

801 Bay Street Toronto 5

'65 REVIEW

In 1965, Sidney Township (Batawa) WPCP treated approximately 80 million gallons of raw sewage, which is considerably less than the pro-rated figure of 95 million in 1964 (the pro-rated figure was arrived at from three months of flow measurements in 1965). The design flow for the plant is 43.8 million gallons per year.

The total operating cost for the year was $7,677.10 or $95.33 per million gallons of sewage treated. Payroll, Chemical, General Supplies, and Repairs and Maintenance costs were up slightly over the previous year. Fuel costs are up 50 percent over last year's cost. Sundry costs are up 137 percent over last year due mainly to the initiation of a sludge haulage program early in 1965.

A foam control system was installed at the plant early in the year. It consists of an effluent pump located in the Chlorine Contact Chamber, a network of two-inch piping circumscribing the aeration tank, and spray nozzles.

A branch of the piping was directed to the chlorinator where final effluent is utilized in the chlorination process.

Outlets were located along the piping where hose connections can be made for lawn watering in the summer time.

All the installation work was carried out by the plant personnel.

GLOSSARY

BOD	biochemical oxygen demand (a measure of organic content)
cfm	cubic feet per minute
comminution	shredding of solids into small fragments
DWF	dry weather flow
effluent	outflow
flocculation	bringing very small particles together to form a larger mass (the floc) before settling
fps	feet per second
gpcd	gallons per capita per day
gpm	gallons per minute
grit	sand, dust, stones, cinders and other heavy inorganic material
influent	inflow
lin. ft.	lineal feet
mgd	million gallons per day
mlss	mixed liquor suspended solids
ppm	parts per million
ss	suspended solids
TDH	total dynamic head (usually refers to pressure on a pump when it is in operation)

HISTORY
1964 - 1965

INCEPTION

The activated sludge treatment plant commenced operation in 1964 and was constructed under Approval Certificate No. 62-A-904.

CONSTRUCTION

The plant design and supervision of construction was carried out by Gore and Storrie Limited, Consulting Engineers. The General Contractor for the works was Lightfoot Construction Company, Belleville.

TOTAL COST:

$52,547.81

J. STEWART
CHIEF OPERATOR

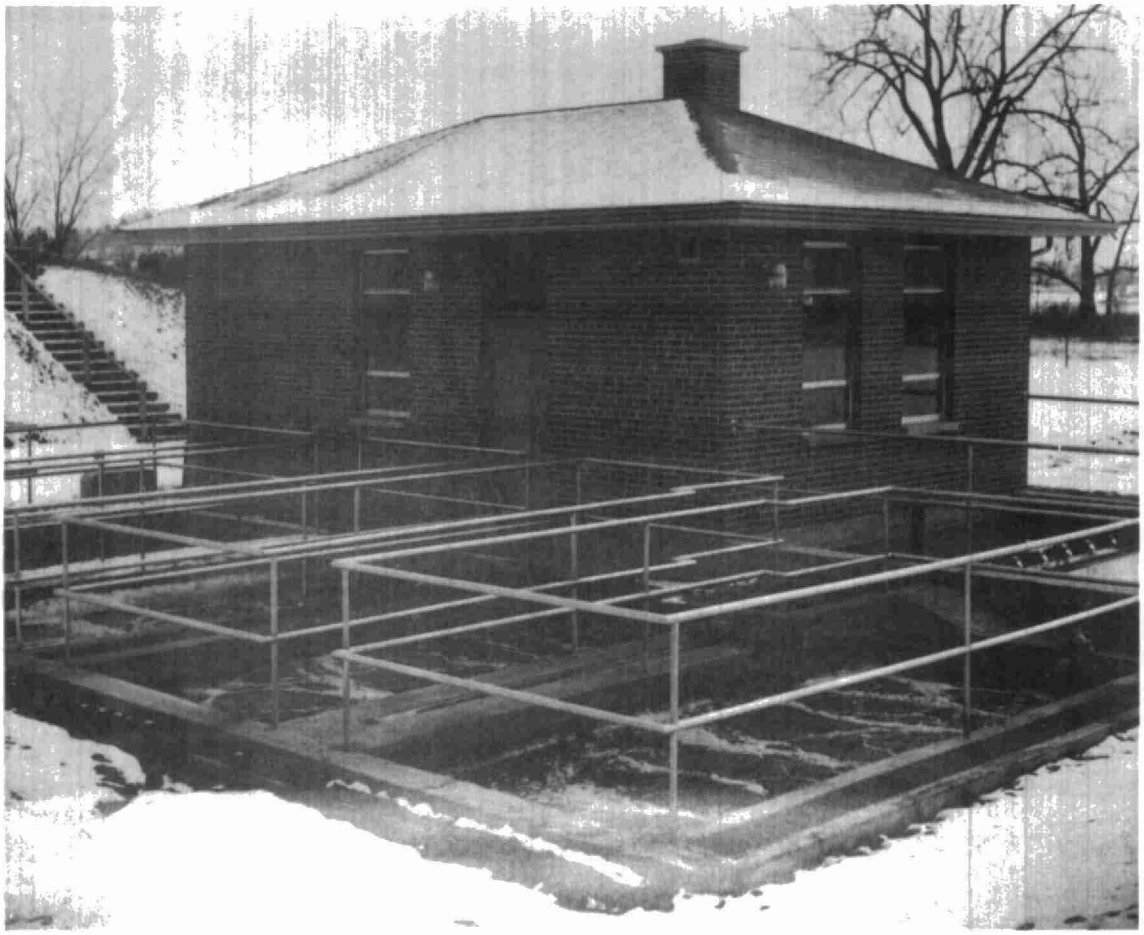
Project Staff

Operator - Mr. D. Herrington

COMMENTS

The project is operated in conjunction with the Town of Trenton Water Pollution Control Plant. Normally, the work load at the Batawa Plant is such that it requires the services of the Operator for 4 hours per day, and the Chief Operator for an average of about six hours each week.

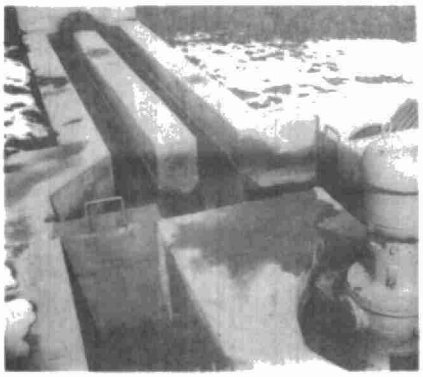
The joint operational arrangement has proven very successful as the experience of Mr. Stewart has been quite helpful in process control and the operation and maintenance of the plant.



Description of Project

INFLUENT WORKS

The waste from the Village of Batawa and the Bata Shoe Company flows through a 15 inch gravity sewer to the Sidney Township Water Pollution Control Plant. At the plant, the sewage enters twin grit channels where its velocity decreases, allowing the heavy inorganic sand, gravel and detritus material to settle.



INFLUENT WORKS, SHOWING TWIN GRIT CHANNELS, COMMINUTOR, BAR SCREENS

In cases of extreme emergency, the plant may be bypassed via a 15 inch sewer joining the 18 inch outfall sewer.

After grit removal, the sewage passes through a comminutor. This machine has cutting edges which shred large materials to a size suitable for further treatment.

PRIMARY SEDIMENTATION

The primary clarifier retains the sewage for approximately two hours. This is long enough for 30 to 35 percent of the suspended solids and BOD to be removed. Solids settle to the bottom forming raw sludge and this sludge is pumped to the digester at frequent intervals.

The lighter materials such as grease float and are decanted into a scum hopper. They are pumped to the digester as they accumulate in the hopper.

The primary effluent flows through a 3 inch Parshall flume where the instantaneous flow may be measured. Any flows in excess of 125,000 gallons per day will bypass the secondary section of the plant at this flume.

SECONDARY TREATMENT

The primary effluent has a great portion of the settleable solids removed. Further sedimentation would not produce any significant reductions in BOD or solids in the primary effluent. A different form of treatment must now be used if the efficiency of removal is to be increased.

A concentrated solution of microscopic bacteria and protozoa known as "activated sludge" is added to the primary effluent and thoroughly mixed with it. These microbes form a gelatinous floc that surround, absorb, and digest dissolved and finely suspended materials in the waste.

In the aeration tanks, large quantities of air are bubbled through the mixed liquor of primary effluent and activated sludge to supply the oxygen necessary for the growth and reproduction of the microbes.

After a 6 hour detention time in the aeration section, the waste passes into the final clarifier where the flocs of bacteria and protozoa readily settle to the bottom. This leaves a clear secondary effluent to be drawn from the top of the clarifier. Removal efficiencies of 90 to 95 percent can be attained by the activated sludge process.

The settled activated sludge in the secondary clarifier is returned to the primary effluent thereby supplying the microscopic bacteria and protozoa for a continuous secondary treatment process. On occasions, too much activated sludge may accumulate and throw the process out of balance. When this occurs, a portion of the activated sludge can be wasted to the primary clarifier where it settles out with the raw sludge and is pumped to the digester.

The final effluent is chlorinated to disinfect it and is discharged to the Trent River through 370 feet of 18 inch outfall sewer.

SLUDGE DIGESTION

Anaerobic sludge digestion at the Sidney Township plant is accomplished in a single stage digester. Raw sludge is pumped to the digester from the bottom of the primary clarifier. Anaerobic digestion takes place with the addition of heat and in the absence of oxygen. The sludge is heated by hot water pipes around the perimeter of the digester. Certain micro-organisms in the sludge are stimulated by these conditions and reduce the putrescible matter in the raw sludge. This is accompanied by a reduction in volume, a concentration of solids, and the production of gases and water.

In the Sidney Township plant, the water is drawn off as a supernatant and mixed with the incoming sewage in the primary clarifier. The gases produces are discharged to the atmosphere. Once the sludge reaches the maximum level in the digester, digested sludge must be hauled to allow room for additional raw sludge. The digested sludge can be disposed in landfill operations or can be used as a soil conditioner.

PROJECT COSTS

NET CAPITAL COST (Estimated)		$162,152.89
DEDUCT - Portion Financed by CMHC (Final)	$109,605.08	
Long Term Debt to OWRC		$ 52,547.81
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1965		$ 4,221.53
Net Operating		$ 7,677.10
Debt Retirement		1,904.00
Reserve		1,111.73
Interest Charged		2,831.09
TOTAL		$ 13,523.92

RESERVE ACCOUNT

Balance at January 1, 1965	$ 1,158.27
Deposited by Municipality	1,111.73
Interest Earned	76.43
	$ 2,346.43
Less Expenditures	(438.40)
Balance at December 31, 1965	$ 1,908.03

MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	* SUNDRY
JAN	436.04	347.34		73.51			5.15			10.04
FEB	516.79	309.18			87.12		45.80			74.69
MARCH	786.69	286.82	78.36	110.14	84.30	115.88	25.48	28.62		57.09
APRIL	504.37	105.25	156.14	69.11	85.35		14.58			73.94
MAY	583.15	224.19	99.24	89.35	85.94		23.89			60.54
JUNE	527.73	144.23		65.15	85.94			1.26	7.32	223.83
JULY	680.75	290.20	30.00	67.02	83.86		60.86	45.94	26.33	76.54
AUG	1019.35	360.91		118.99	98.46	115.88	59.45		147.92	127.74
SEPT	1268.18	210.93	24.00		90.54		47.34			895.37
OCT	548.52	165.75	12.00	51.95	87.72				93.76	137.34
NOV	628.80	265.73		73.73	88.32	115.88	39.40			45.74
DEC	176.73	(282.96)		174.52	89.21		21.49			174.47
TOTAL	7677.10	2427.57	399.74	893.47	956.76	347.64	343.44	75.82	275.33	1957.33

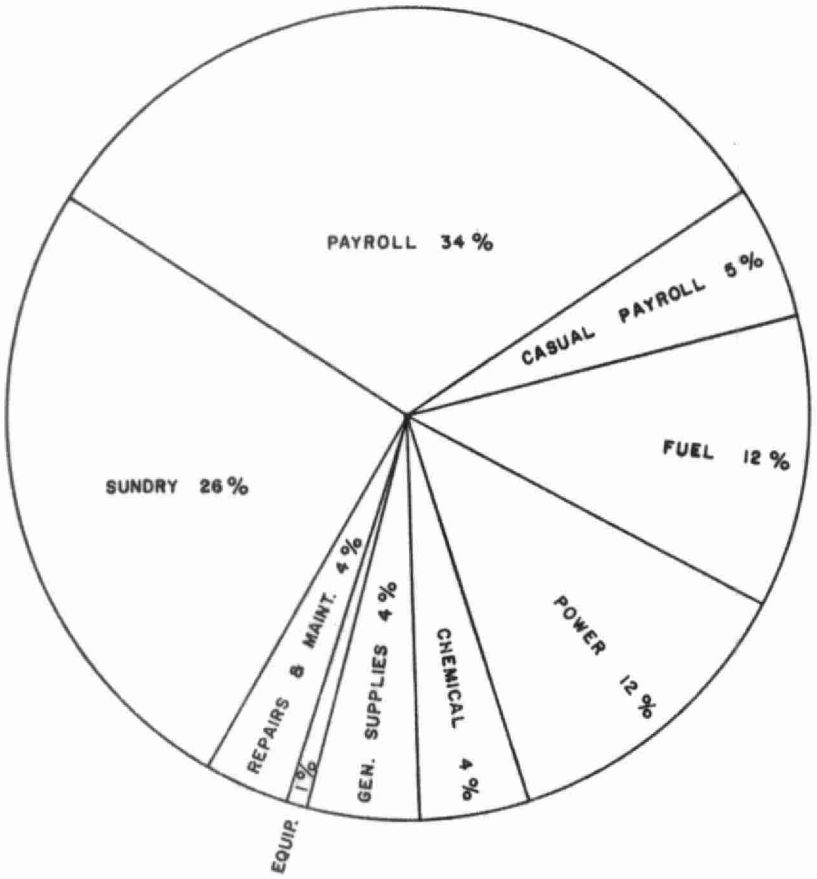
* SUNDRY INCLUDES SLUDGE HAULING COSTS WHICH WERE $387.00

YEARLY OPERATING COSTS

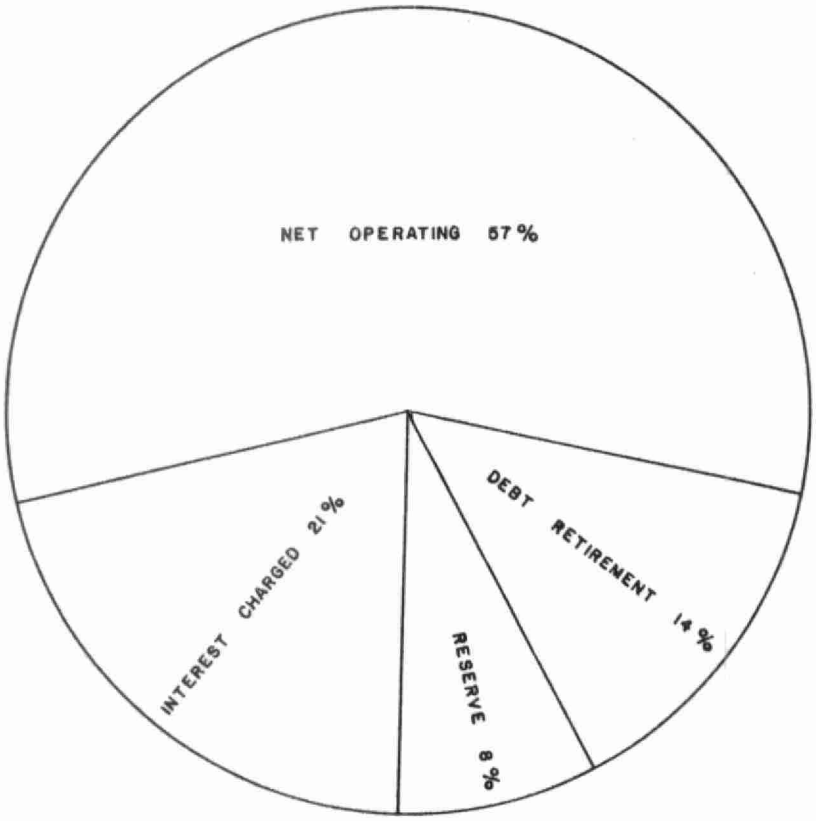
YEAR	M.G. TREATED	TOTAL COST	COST PER MILLION GALLONS
1964	* 95.590	$ 6024.26	$ 63.02
1965	80.53	7677.10	95.33

* PRO-RATED ON ESTIMATED FLOWS OCTOBER - DECEMBER

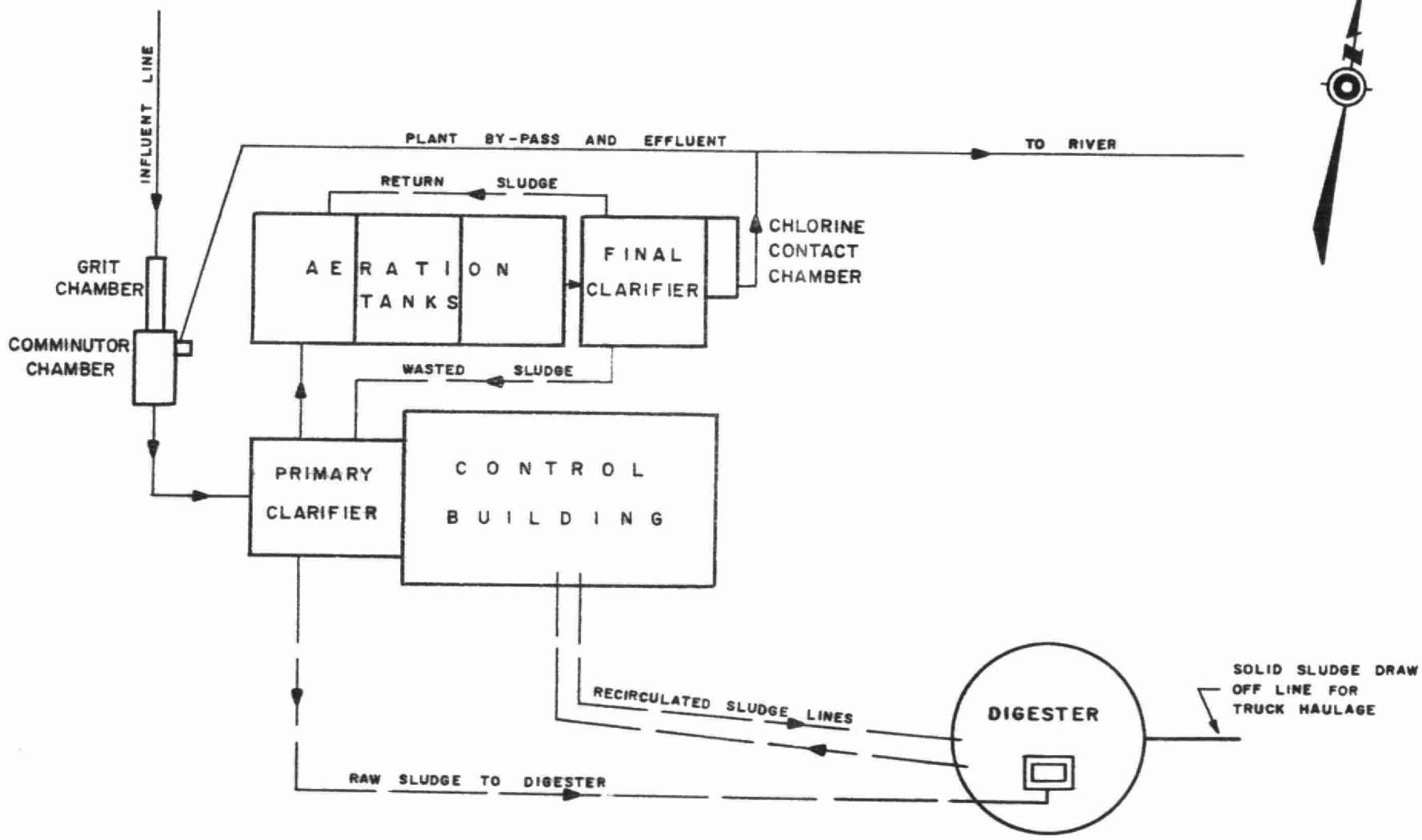
1965 OPERATING RESULTS



TOTAL ANNUAL COST



Technical Section



SIDNEY – BATAWA W P C P

FLOW CHART

Design-Data

GENERAL

Type of Plant - Activated sludge process.

Design Population - 1500 persons

Design Flow - 120,000 gallons per day (80 gallons per capita per day).

Five Day BOD

Raw Sewage - 220 ppm

Removal - 90%

Suspended Solids

Raw Sewage - 250 ppm

Removal - 90%

PRIMARY SEDIMENTATION

Volume of Tank - 10,000 gallons.

Detention time - 2.0 hours at design flow.

Surface Settling rate - 458 gallons per square foot per day.

Weir Overflow rate - 3750 gallons per foot of weir length per day.

AERATION

Three-pass step aeration tank.

Volume of tank - 37,500 gallons.
Detention time - 6 hours
Air supply through porous ceramic diffusers at 1.4 cu. ft. per gallon.

FINAL SEDIMENTATION

Volume of tank - 14,200 gallons.

Detention time - 2.85 hours at design flow.

Surface Settling rate - 500 gallons per square foot per day.

Weir overflow rate - 5000 gallons per foot of weir length per day.

CHLORINE CHAMBER

Detention time - 20 minutes.

SLUDGE DIGESTION TANK

Capacity of tank - 37,500 gallons or 4 cu. ft. per capita.

Loading - 1.5 lbs. of solids per cubic foot of tank per month.

Digested sludge removed by tank truck.

HEAT EXCHANGER

American Standard gas fired boiler.
Model GW26-1
Input of 150,000 BTU per hour.
Output of 120,000 BTU per hour.

SLUDGE PUMP

Marlow piston pump Model PEG1A-2
7 inch plunger.
40 usgpm @ 40 ft. head.

V-belt drive.
Motor - General Electric model 9F1105-P3F, 1.5 hp, 2.1 amps, 550 volts, 3 phase, 1145 rpm.

AIR BLOWERS

Two Sutorbilt air blowers.
Size 5M, disp. 210.
Motors - Leland Newman 7 1/2 hp, 1760 rpm, 8 amps, 3 phase, 550 volts.

DIGESTER HOT WATER CIRCULATING PUMP

Armstrong 1 1/2 inch, 15 usgpm @ 8 ft. head.

Motor - General Electric 1/6 hp, 2.85 amps, 110 volts, 1725 rpm.

CONTROL BUILDING HOT WATER CIRCULATING PUMP

Armstrong 3/4 inch pump, 5 usgpm @ 6 ft. head.

Motor - General Electric 1/10 hp, 2.3 amps, 110 volts, 1725 rpm.

Process Data

The information contained in the Process Data is useful in determining the overall efficiency of the plant. It reflects the good points and shortcomings of the treatment system and is a good basis for the comparison of the operation from year to year with similar plants.

The flow results, which depend on the presence of an operator to take the measurements, are obtained from a Parshall flume. As the operation of the plant requires only a part-time operator for four hours of the day, more accurate results cannot be obtained under the present conditions.

In 1966 a totalizer and recorder will be installed in conjunction with the existing Parshall flume to facilitate better flow records.

PROBABILITY OF FLOWS

From the 1965 curve it can be seen that 93.5 percent of the flows are equal to or greater than the design flow of the plant which is 0.120 mgd.

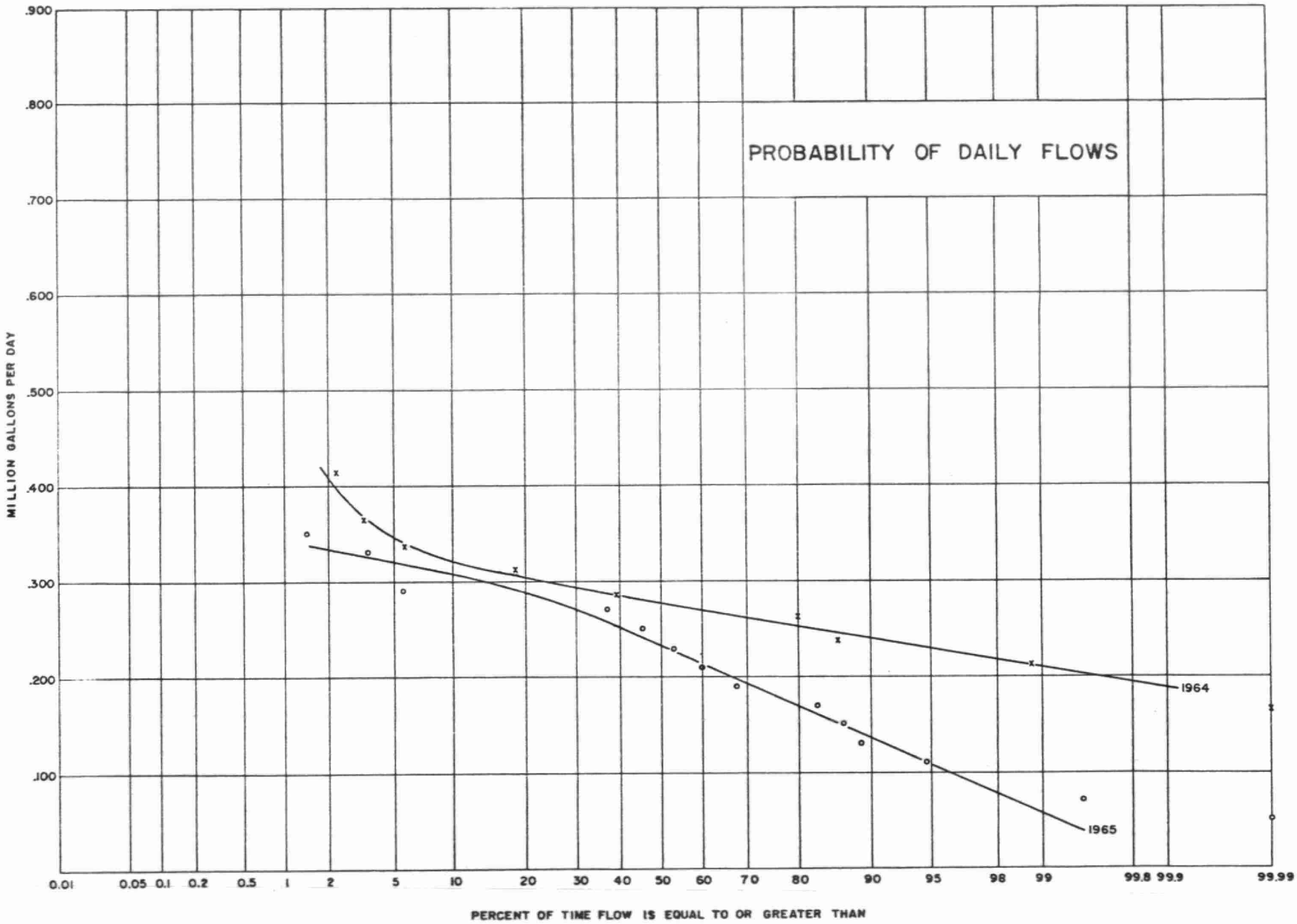
Forty percent of the flows are equal to or greater than 0.25 mgd, the flow rate at which by-passing of the secondary treatment occurs at the Parshall flume.

AVERAGE DAILY FLOWS

The average daily flows are for periods of one month. The lowest monthly daily flow was recorded in July at 0.13 mgd and the highest in March at 0.28 mgd.

MONTHLY BOD VARIATIONS

The highest monthly BOD for raw sewage was 80 ppm and the lowest was 15 ppm. For a normal sewage treatment system the BOD for domestic raw sewage should be about 170 ppm. It is therefore evident that the raw sewage contains excessive amounts of unpolluted water.


PROBABILITY OF DAILY FLOWS
MILLION GALLONS PER DAY
.900
.800
.700
.600
.500
.400
.300
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0.05
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0.2
0.5
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30
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50
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70
80
90
95
98
99
99.8
99.9
99.99
PERCENT OF TIME FLOW IS EQUAL TO OR GREATER THAN
1964
1965

AVERAGE DAILY FLOW
M.G.D.
.500
.450
.400
.350
.300
.250
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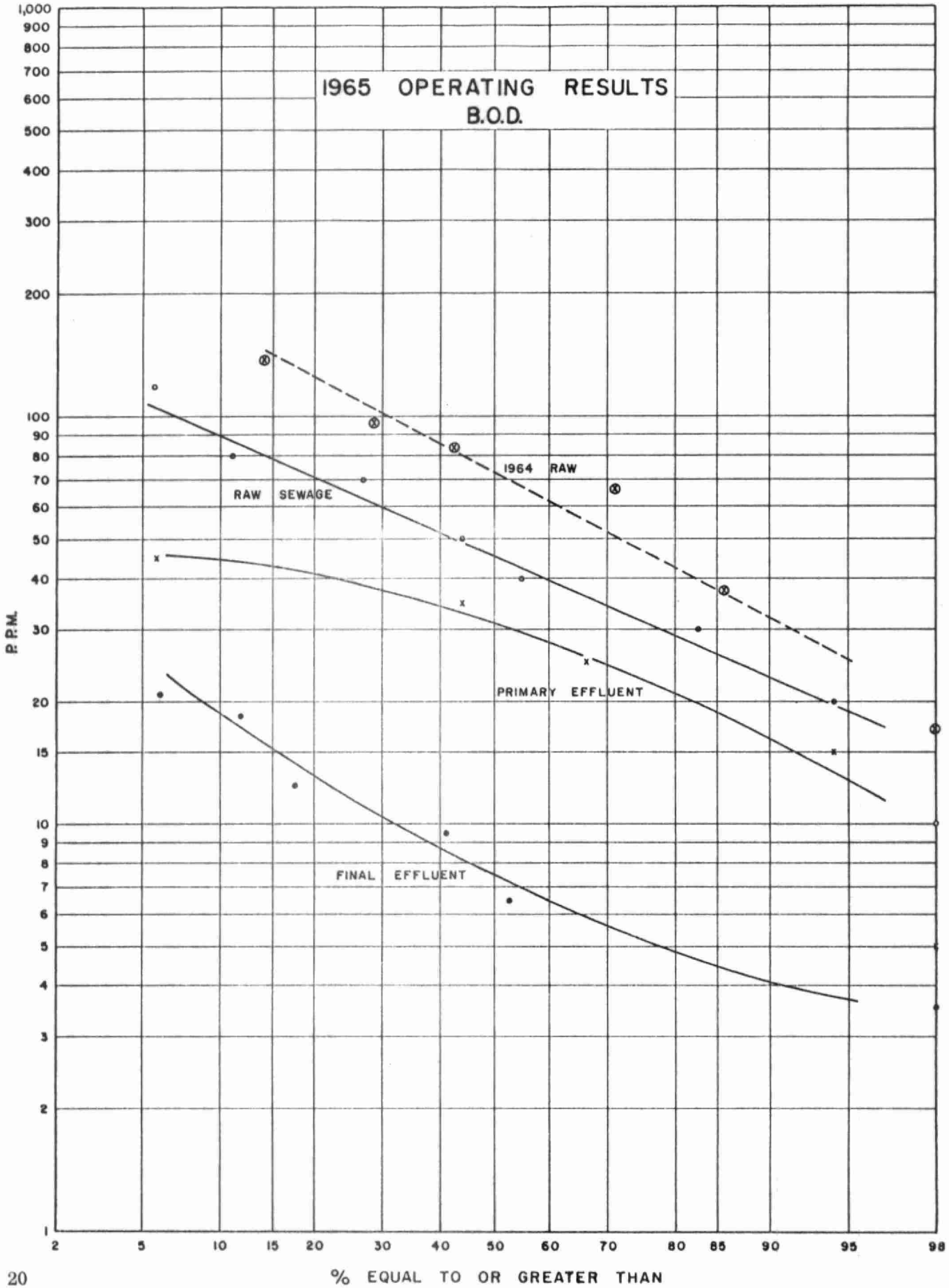
0
JAN FEB MAR APR MAY JUNE JULY AUG. SEPT OCT. NOV. DEC.
1964
1965
19
19
19

19


1965 OPERATING RESULTS
B.O.D.
1964 RAW
RAW SEWAGE
PRIMARY EFFLUENT
FINAL EFFLUENT
P.P.M.
% EQUAL TO OR GREATER THAN
1,000
900
800
700
600
500
400
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200
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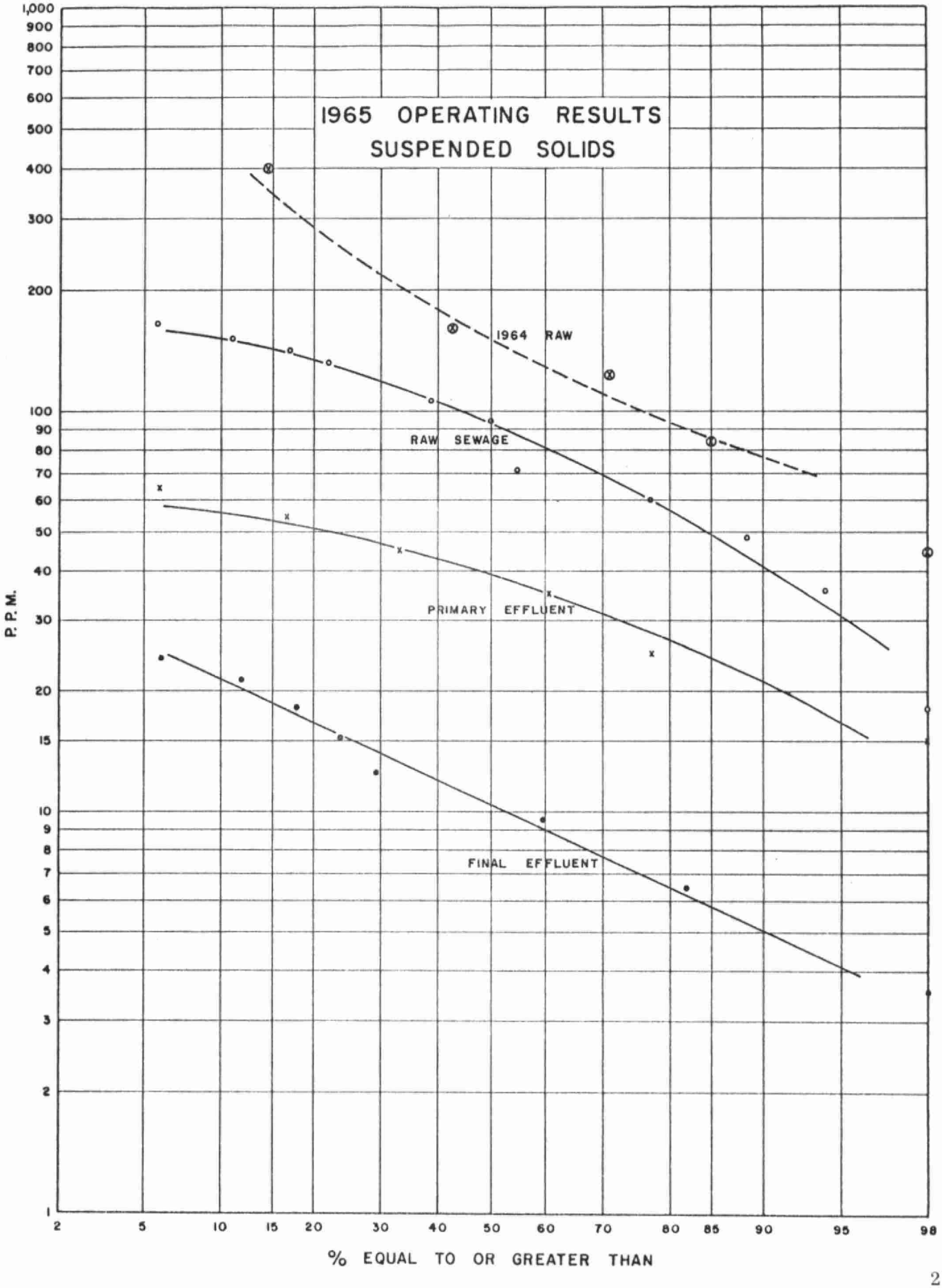
1965 OPERATING RESULTS
SUSPENDED SOLIDS
1964 RAW
RAW SEWAGE
PRIMARY EFFLUENT
FINAL EFFLUENT
P.P.M.
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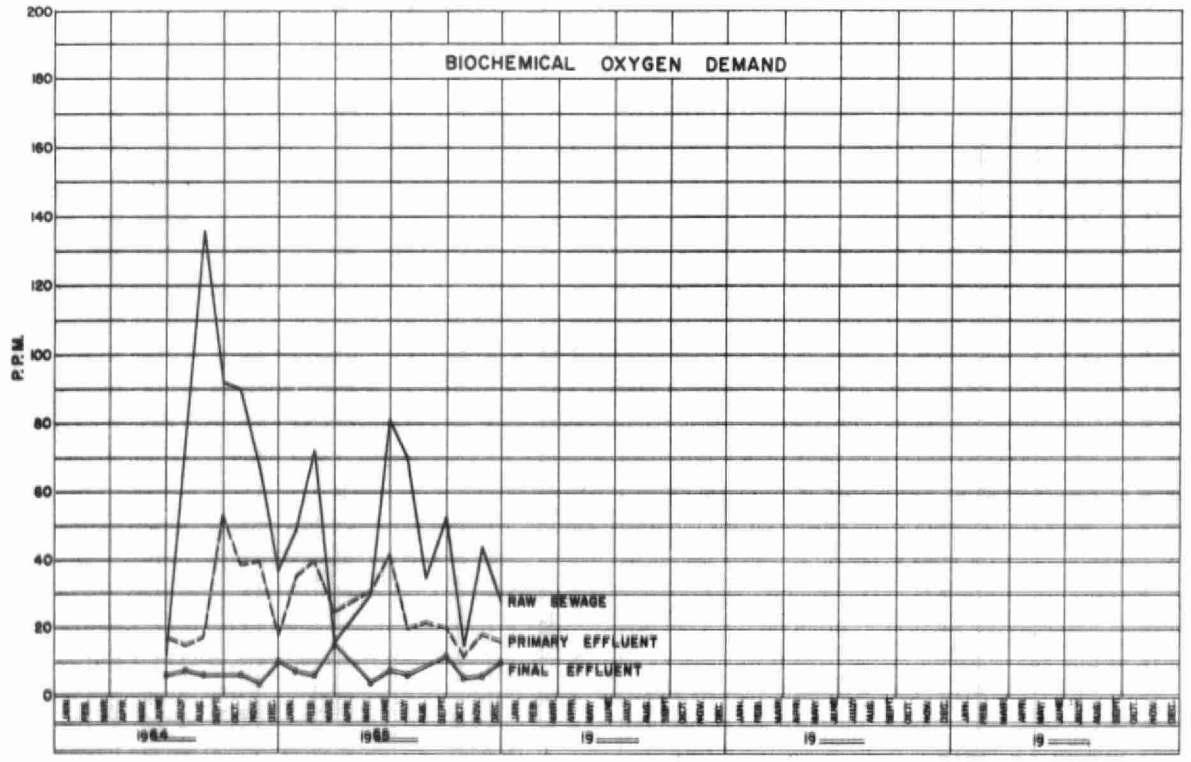
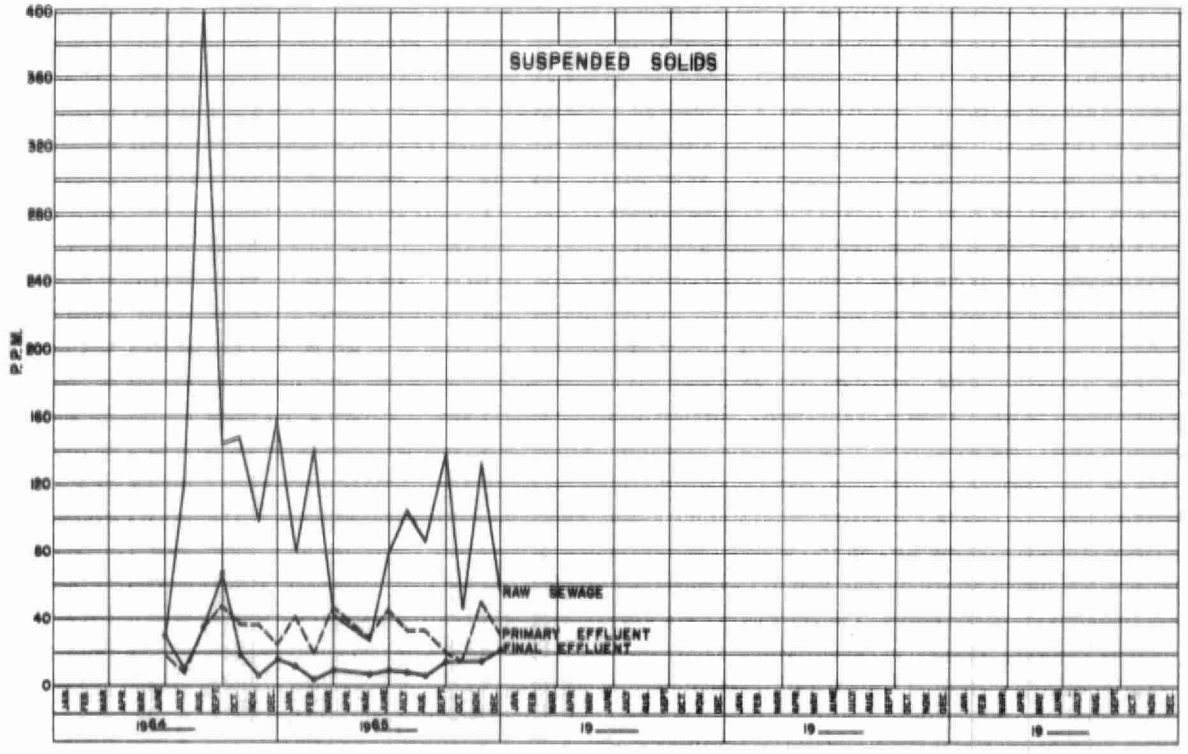


MONTHLY VARIATIONS



GRIT, B.O.D AND S.S. REMOVAL

MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	
JAN.	49	7	85.5	1.8	82	12	85.5	2.9	-
FEB.	72	6	91.5	2.5	147	4	97.0	5.5	-
MAR.	16	13	18.5	0.1	42	9	78.5	1.5	2
APR.	*45	8	82.0	1.6	*85	11	87.0	3.1	4
MAY	30	3.8	87.5	1.1	28	7	75.0	0.8	2
JUNE	81	7	91.5	2.1	78	9	88.5	2.0	-
JULY	70	6	91.5	1.3	94	8	91.5	1.8	4
AUG.	35	9	74.0	0.7	86	6	93.0	2.0	-
SEPT.	52	12	77.0	1.0	139	15	89.0	3.0	-
OCT.	15	5.2	65.5	0.3	47	13	72.5	1.1	4
NOV.	44	6	86.5	1.2	132	14	89.5	3.7	4
DEC.	28	10	64.0	0.6	58	21	63.5	1.2	3
TOTAL	-	-	-	14.9	-	-	-	29.8	23
AVG.	45	8	82.0	1.2	85	11	87.0	2.5	2

* Average values substituted. No sample taken.

COMMENTS

During 1965 the average BOD of the influent sewage to the plant was 45 ppm, a 28 percent reduction over last year. The average BOD of the final effluent was 8 ppm. The efficiency of BOD removal was 82 percent and the total tons of BOD removed was 149 .

The average strength of the influent suspended solids was 85 ppm and the efficiency of its removal was 87 percent. The total amount of suspended solids removed was 29.8 tons and the total amount of grit removed was 23 tons.

AERATION SECTION

MONTH	PRIM. EFFL. B.O.D. P.P.M.	M.L.S.S. P.P.M.	LBS. B.O.D. PER 100 LBS. M. L. S. S.	CUBIC FEET AIR PER LB. B.O.D. REMOVED
JANUARY	35	1373	19	-
FEBRUARY	40	1083	29	-
MARCH	25	1059	20	-
APRIL	-	965	-	-
MAY	31	1299	17	-
JUNE	42	1303	17	-
JULY	20	1641	6	-
AUGUST	22	1632	6	-
SEPTEMBER	20	1691	6	-
OCTOBER	12	1669	4	-
NOVEMBER	18	1815	5	-
DECEMBER	16	1826	5	-
TOTAL	-	-	-	-
AVERAGE	26	1446	12	-

COMMENTS

The average BOD of the influent to the aeration tank was 26 ppm. The average MLSS concentration was 1,446 ppm and the average weight of BOD per 100 lbs. of MLSS was 12 lbs.

DIGESTER OPERATION

Month	Sludge to Digesters 1,000 cu. ft.	Sludge from Digesters 1,000 cu. ft.
January	4.73	-
February	6.65	-
March	6.23	-
April	3.23	-
May	5.58	-
June	7.38	-
July	9.17	0.96
August	9.31	1.12
September	8.56	1.60
October	9.92	-
November	8.58	1.76
December	7.73	-
Total	87.07	5.44
Average	7.26	1.36

COMMENTS

A monthly average of 7,260 cubic feet of sludge was directed to the digester and a monthly average of 1,360 cubic feet was removed from the digester. The efficiency of sludge reduction in the digester was 82 percent.

Percent solids and volatile matter determinations were not taken in 1965 but will be in 1966.

Gas produced in the digester is vented to the atmosphere as there isn't sufficient production for use as a boiler fuel.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (P.P.M)
JANUARY	8.32	181	2.18
FEBRUARY	7.70	* 116	1.97
MARCH	8.92	195	2.19
APRIL	8.47	152	2.78
MAY	8.13	170	2.09
JUNE	6.59	206	3.62
JULY	4.08	200	4.90
AUGUST	5.14	193	3.75
SEPTEMBER	4.90	195	3.98
OCTOBER	6.62	176	2.66
NOVEMBER	6.29	184	2.92
DECEMBER	6.27	** 188	3.36
TOTAL	80.53	2156	-
AVERAGE	6.71	180	2.76

* 21 days chlorination
** 28 days chlorination

COMMENTS

Since the plant flows recorded are approximations only, so are the chlorine dosage rates.

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RECOMMENDATIONS

1. The excessive amounts of unpolluted water contained in the raw sewage should be eliminated.

2. Flow measuring and recording equipment should be installed at the plant.

ONTARIO WATER RESOURCES COMMISSION